

# **EXHIBIT A**

**Neal A. Growney & Assoc., L.L.C.**

Franklin Lakes, New Jersey 07417-2319

**Engineer's Report**

**November 12, 2009**

**1.0 Introduction.**

On March 25, 2007, Robert McGee was working as an assistant superintendent for Joseph Jingoli & Son, Inc. at the Grows Landfill site, Pennsbury and Bordentown Roads, Morrisville, Pennsylvania 19067. He was cutting HDPE plastic pipe with a portable, hand held, gasoline powered, demolition saw and was involved in an incident in which he was injured. I investigated this matter in order to determine its cause and any design or warning defects with respect to the tools being used.

**2.0 Available Information.**

- 2.1 My inspection on August 9, 2007, at Joseph Jingoli & Sons office, 3131 Princeton Pike, Bldg. 4, Suite 214, Lawrenceville, New Jersey 08640, of the incident and interview of Robert McGee.
- 2.2 Transcripts of the Depositions of: Robert McGee on October 27, 2008 and May 11, 2009; Peter Linsbauer, August 28, 2008 and July 24, 2009; Thomas Elsner; Holger Lochmann; Randy Scully; Steve Caldwell; Antonio Rivera; Bruce Knelly; Stefan Hofmaster; George Brown; Ed Kuhn; Joseph Rufolo; Anton Spiritsanto; Ron Brown; Michael Klemick; Stephen Hanes; Dionoso Roman and Terence Kilker.
- 2.3 Robert Dubois, of Earth Tech incident report, dated 3/25/07.
- 2.4 Falls Township Police Incident Report, Julian Number 07084-088-02, dated 3/25/07.
- 2.5 Stihl TS 400 Cutquik Instruction Manual, owner's Manual. Stihl TS 400 Safety Manual.
- 2.6 Stihl Cut-off Saw DVD.
- 2.7 Joseph Jingoli & Sons purchasing records of Stihl TS 400 saws and blades from Sanders Power Equipment Company.
- 2.8 Plaintiff's Answers to Interrogatories by Black & Decker.
- 2.9 Nine (9) 8 ½ inches X 11 inches color photographs.
- 2.10 One (1) 8 ½ inches X 11 inches color photograph marked Kuhn 13.
- 2.11 Thirty (30) 8 ½ inches X 11 inches color photographs marked 03.25.2007 12: with markings ranging from 06 though 17.

**3.0 Description of Incident.**

On the morning of this incident, the Jingoli crew was installing pipelines in an excavated trench that ran through a roadway. The pipelines were two ten inches diameter plastic (HDPE) pipes, running parallel to each other in the trench at the same depth. The pipes extended up and out of the trench by at least 50 feet. At approximately 11:30 AM, McGee was in the process of cutting one of the pipes in order to splice it to another run of pipe that was already in the trench and cut. The pipe he was to cut came out of the trench where it was

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supported by the trench's lip. It ran for some distance and went over a dirt berm adjacent to the trench, which supported the pipe. The point at which he was to cut the pipe was elevated above grade, and between the lip of the trench and the dirt berm. Its other end was in the trench resting on the dirt (p. 180).

McGee picked up a demolition saw on the jobsite that had a toothed saw blade installed on it. He inspected the blade installed on the saw and checked the saw's fuel (# 2, p.169). McGee stood on grade, near the pipe to be cut and started the saw. After starting, he released the choke and pressed the throttle a couple of times to make sure the saw was working properly. It operated normally.

McGee. McGee stood in position on the outside of the pipe arrangement to begin the cut with his legs apart. McGee's left hand was on the handle and right hand on the throttle. The machine was on his side (p. 261). McGee started to cut the outside of the pipe with the blade contacting the pipe at approximately 3 o'clock (position-wise on the pipe's diameter), worked his way up and then down - close to 6 o'clock (p. 262). He then released the throttle and stepped over the pipe at its lowest point.

McGee next positioned himself between the two pipes and began a plunge cut into the side of the pipe; and then cut down to connect to the bottom cut he had made from the other side (# 2, p.169). McGee pulled the saw out of the cut and began to plunge cut the portion of the top remaining. Suddenly and without warning, the saw kicked back, struck him the right side of his face, injuring it. McGee lost his balance and fell backwards (# 2, pp. 171,172).

#### **4.0 The Incident Demolition Saw and Blade.**

The portable, hand-held, gasoline powered, demolition saw involved in this incident is a Stihl model TS 400 Cutquik, demo saw, serial number 161640975. At the time of this incident, it had an Oldham, Heavy Duty Construction Carbide 14", 24 Tooth, saw blade installed on it. See Photos 03.25.2007 12:06, 03.25.2007 12:07 and 03.25.2007 12:08, attached, taken the day of this incident.

#### **5.0 Inspection Observations.**

5.1 No blade was installed in the saw at the time of my inspection.

5.2 A sticker affixed to the side of the blade guard opposite the blade installation guide (Photos # A 16, A 19, A 23) displaying:

4221-007-1009;

1 Stuck;

Support with guard 350mm;

Additional wording in other languages;

a bar code with the numerals 7 95711 14 350 3 accompanying it and two icons (red in color).

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- 5.3 A sticker is attached to the top of the saw with black lettering approximately ½ inch high, on a white background stating (Photos # B 03, B 08):

**STIHL®**  
**TS 400**

The brand Stihl also appears on the right side of the saw near the gas tank cap (Photo # A 16).

- 5.4 A sticker is affixed to the right side of the saw (Photo # B 14) stating:

WARNING: for safe operation  
Follow all safety precautions in  
Owner's manual-improper use  
Can cause serious or fatal injury.

- 5.5 A sticker having faded black lettering on a white background is affixed to the left side of the trigger grip in the recess portion of the top of the saw (Photo # B 12) stating:

4221 – 007 – 1009

1 Stuck

*(Other lettering illegible)*

- 5.6 A sticker containing seven pictograms is affixed to the saw on its upper right side. See Photos # A 01 and A 03.

## **6.0 Discussion and Opinions.**

6.1 Prior to starting the saw, McGee checked the blade installed on the cutoff saw for defects by rotating it and made sure it was on properly (p. 257). He inspected the blade for cracks and tightness (# 2, p. 160) from its mounting side (Opposite the pull cord side); the side an installer would face when installing such an Oldham blade on such a Stihl demo saw. McGee stated that's how it is done in the field (# 2, p. 161). It is reasonably foreseeable that operators such as McGee, putting a Stihl demo saw, having a blade already mounted on it, into service would inspect the blade from only one side. Such an inspection is not inconsistent with Stihl's, or Oldham's instructions.

6.2 McGee testified he was pretty sure the blade on the Stihl demolition saw at the time of his injuries had writing on it that included the Oldham brand. Oldham's text is on only one side of the blade, the side that would not normally face the installer during installation on a demo (cut-off) saw. See Photos 03.25.2007 12:06, 03.25.2007 12:07 and 03.25.2007 12:08. McGee testified that a lot of the blade's writing was covered up by the back side of the guard as it covers up half of the blade (# 2, p. 153). With writing on one side only, the blade can be

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inspect for crack from the side with no writing and the inspector not see, nor necessarily read what is written on its other side. Photographs referred to above and in 4.0 shows that the blade was, in fact, an Oldham 14", 24-tooth woodcutting saw blade.

6.3 Demo, or demolition, saw is a name commonly utilized in construction and other trades for hand held, portable, gasoline powered, cutoff saws that utilize certain types of circular abrasive blades for cutting. They are also commonly referred to as concrete cutoff saws. ANSI B175.4-2006, the American National Standard Safety Requirements Portable, Handheld, Internal-Combustion-Engine-Driven-Cut-Off Machines, refers to them as cut-off machines. Deposition testimony of Jingoli employees who used these saws regularly reflects the common identification of these saws as demo saws.

6.4 Demo saws are commonly utilized to cut materials such as concrete, stone, asphalt pavement and steel in a grinding fashion known as cutting-off, with abrasive wheels (disks, blades) mounted in them. These abrasive wheels are typically reinforced composite grinding wheels, or metal disks having abrasives such as diamonds, covering an area on both side of its periphery. These wheels cut by the abrasion of there moving surfaces against the work (grinding).

6.5 Composite abrasive cutting-off wheels are reinforced in order to operate at high speeds. Diamond coated abrasive cutting-off wheels are similar to saw blades in that they are both circular steel disks with a bore. Some abrasive wheels are configured with radial slots in their periphery, in arrangements that could be construed as cutting teeth by users of these cutting-off wheels. However, cutoff wheels do not have teeth as toothed circular saw blades have.

6.6 Abrasive cutting-off wheels are configured with an arbor hole (bore) for their mounting on demo saws arbors (spindles). Their bores commonly contain a formed metal sleeve/collar insert. See Stihl Power Tools & Accessories, 0463.931.3023.M590.L6.LD, 2006, P. 110.<sup>1</sup> Reducing bushings facilitate the installation of reinforced abrasive cutting-off wheels with arbor holes larger than that of the machine's spindle. The abrasive wheel installed on the arbor is clamped between two flanges that are secured to the arbor with a central hex head cap screw (Arrow, Photo # A 01). The inner areas of the flange faces do not contact the abrasive wheel; only the outer areas contact the wheel. The arbor's driving torque is transmitted to the abrasive cutting-off wheel through these contact areas.

6.7 Carbide-toothed circular saw blades are circular steel disk with teeth on their periphery that have formed carbide inserts affixed to them. Carbide-toothed, wood cutting, circular saw blades are commonly utilized in stationary and portable wood cutting saws. They are available in a number of diameters, including fourteen inch, and a number of bores. Carbide-toothed saw blades have been known to discharge their carbide inserts when operated at excessive speeds. Persons in proximity to such an occurrence risk injury.

6.8 Demo saws have similarities to hand held, portable circular saws commonly utilized in construction and differ in a number of significant points. Demo saw's safety guard cover only the top half of the cutting-off wheel; leaving the balance of the wheel unguarded. It deflects sparks and cut material away from its operator. It does not provide protection from the exposed portion of the wheel. Operators may construe that it does provide such protection.

<sup>1</sup> Exhibit G-74, 11/11/2008, HUD-L-003826-06.



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6.9 ANSI/UL 45, the industry standard for hand held circular saws requires saw blade guards to have a moveable lower portion to cover the blade's hazardous moving teeth, except for a maximum of 25° of the blade's total toothed periphery in its closed position. This lower portion of the guard retracts as the saw moves through the work. The circular saw moveable blade guard design is intended to provide added protection from the saw's dangerous and hazardous spinning toothed blade. This level of safeguarding is not available on the incident Stihl TS 400 demo saw.

6.10 Demo saws possess gyroscopic forces caused by the rapid spinning of the cutoff wheel that opposes directional changes when the demo saw is rotated in a sideways direction.

6.11 The Oldham 14", 24 Tooth Heavy Duty Construction Carbide saw blade has formed carbide tooth inserts affixed to it. This saw blade's maximum speed is specified as 5,000 RPM. The incident demo saw's maximum arbor speed is specified as 5,350 RPM. The demo saw's specified maximum speed is greater than this saw blade's maximum speed. The dangerous hazard of the Oldham Carbide 14", 24 Heavy Duty Construction Carbide Tooth blade discharging teeth during operation, and those teeth striking its operator or bystanders, exists with this blade installed on the incident Stihl TS 400 demo saw as the saw's maximum speed exceeds the blade's maximum speed. However, in this case there is no evidence of such a tooth discharge and it is therefore not a causative factor in this case.

6.12 HDPE is high density polyethylene plastic. Peter Linsbauer is the head of Andreas Stihl's department that designs as well as makes the TS 400. Linsbauer testified that there is no cutting attachment for a TS 400 that is intended to cut HDPE pipe, and that it should not be done (# 2, pp. 13, 15)<sup>2</sup>. He testified that the grinding action/process, of a TS 400's abrasive cutting wheel would melt the plastic (# 2, pp. 15-16). However, there is no specific reference to HDPE pipe in Stihl's manual and there is no warning on the TS 400 itself against cutting HDPE or plastic pipe (Linsbauer # 2, p.32).

6.13 A dangerous hazard, known as "kickback", exists during the operation of demo saws. For demo saws, and also hand held circular saws, kickback is a sudden reaction to a pinched, bound or misaligned rotating blade, causing the saw to lift up and out of the workpiece towards the operator. When the blade is pinched or bound tightly by the kerf (the slot in the work piece being cut) closing down on the rotating blade, the blade stalls and the motor or engine reaction drives the saw rapidly back towards the operator. If a toothed blade becomes twisted or misaligned in the cut, the teeth at the back of the back edge of the blade can dig into the top surface of the material causing the blade to climb out of the kerf and jump back towards the operator. Demo saws' kickback hazard is significantly increased with a toothed blade installed because of the aggressive, digging action of the teeth.

6.14 Diamond abrasive cutting wheels (disks, blades) and reinforced abrasive wheels are commonly available with one (1) inch bores. They are commonly utilized on 20 millimeter (mm) (approximately .787 inch or 25/32 inch) diameter arbors (spindles) by the use of a reducer bushing. One (1) inch diameter is a standard bore size for toothed circular saw blades. Stihl TS 400 demo saws have 20 mm diameter arbors. Toothed circular saw blades having a one inch diameter bore can be readily installed on Stihl demo saw arbors with the use of commercially available reducer bushing.

<sup>2</sup> # 2, Civil Action No. 08-cv-00520, July 24, 2009.

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6.15 DeWalt, another Black & Decker blade producer, includes three reducer bushings in the packaging for their DeWalt XP, DW4742, 14" Dry/Wet Diamond Blade having a one inch bore. Oldham knows that bushings to reduce one inch bores to fit on 20 mm spindles are commercially available; and that they would facilitate the installation and use of this blade on demo saws with 20 mm arbors. Oldham knows that its 14", 24 teeth blade is readily capable of and will be installed on saws having 20 mm arbors, including Stihl TS 400 demo saws, with the use of reducer bushings. There is no unorthodox steps, no jury-rigging involved in mounting a 14' toothed circular saw blade on a TS 400. The ease of their installation promotes a false sense of security that such blades are meant for safe use in these machines.

6.16 It is not obvious that there is an inherent dangerous hazard associated with the use of these saws with these blades installed. The ease of installing this Oldham blade on the TS 400 demo saw, using the same reducer bushing utilized to install diamond blades and reinforced abrasive wheels with one inch bores on these demo saws, with the lack of an outward clue that this combination is unsafe and not intended, reinforces the sense that these blades safe and intended for use on demo saws.

6.17 It is reasonably foreseeable that operators of TS 400, having the power to cut concrete, stone, asphalt pavement and steel, would intuitively assume that the TS 400 would easily cut softer and weaker material, especially when equipped with a toothed saw blade. It is counter-intuitive for TS 400 users to reason that this saw, that can cut such harder material, is unsafe to cut softer material such as plastic pipe.

6.18 Operators of the Stihl TS 400, having an Oldham Heavy Duty Construction Carbide 14", 24 Tooth, wood cutting blade installed, are at greater risk of severe injury due to this combination's greater propensity for reactive kickback; and also that the Stihl TS 400 lacks the level of spinning blade safeguarding provided by the lower blade guard of hand held circular saws. The installation of carbide-toothed saw blades on a Stihl TS 400 demo saw, as if such blades were intended for use and safe on demo saws is a reasonably foreseeable, latent, dangerous hazard that must be safeguarded.

6.19 It had been a practice at Jingoli to cut HDPE plastic pipe with the TS 400/Oldham toothed saw blade McGee was utilizing at the time of his accident. McGee had observed this practice a number of times. Antonio Rivera cut HDPE pipe with the same demo-saw/toothed-blade combination. McGee did not know at the time of this incident that using a demo saw with a toothed blade to cut was prohibited and dangerous. McGee testified that he found cutting HDPE pipe with the demo-saw/toothed-blade combination to be efficient and left a clean cut. This was contrary to the results he obtained when he tried cutting HDPE pipe with an abrasive wheel installed on a demo saw. That combination was slow and melted the plastic; which required the additional work to remove the residual melted plastic lip before the pipe could be fused to another pipe.

6.20 Deposition testimony by McGee's coworkers, and also Jingoli's purchasing agent, was that they did not know that the demo using a demo saw with a toothed blade to cut was prohibited and dangerous. A yellow warning sticker typically found on the Stihl TS 400's blade cover was missing. At the time of this incident there were no warnings on the Stihl demo saw, either textural or pictograms against using toothed saw blades in it. Oldham's text

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to not use the blade on multi-purpose cutoff saws including gas powered saws unless it had certain guard configurations is for the most part obscured by the blade cover when the incident blade was installed in the incident Stihl TS 400. See Photographs 03.25.2007 12:06 and 03.25.2007 12:07.

6.21 A dispute with the carpenter's union over whose job it was to cut such pipe was resolved by the adoption of the practice of cutting such pipe with this demo-saw/toothed-blade combination. At the time of this incident, McGee had no other tool available to him to cut the HDPE pipe.

6.22 When asked why he did not use a chain saw to cut the pipe instead of using the demo saw, McGee testified because the (Oldham) blade fit on the saw and it cut good (# 2, p. 190). It was counter-intuitive for McGee to conclude otherwise. It was not known by Jingoli personnel that the TS 400's manual indicated that carbide tipped toothed saw blades should not be utilized on TS 400's. McGee believed that the Oldham blade was safe to use on the Stihl demo saw because: "it fit and we never had any problems before" (# 2, p. 202). Had the blade not fit on the saw McGee would not have used the Stihl demo saw with the Oldham toothed blade on it and this accident would never have occurred. Had Stihl designed this demo saw so that the Oldham toothed blade would not fit on it, McGee's injuries would not have occurred. A substantial cause of this accident was the Stihl TS 400's facility to accommodate the toothed saw blade.

6.23 At the time Stihl designed the TS 400 it knew that 12-inch diameter and 14-inch diameter wood cutting blades were commercially available and that abrasive wheels and diamond abrasive blades with one inch arbor holes were also commercially available. Stihl knew that abrasive wheels, diamond blades and wood cutting blades with one inch bores could be used on TS 400 20 millimeter arbors by utilizing a reducer bushing (Linsbauer # 1, p. 64)<sup>3</sup>.

6.24 At the time Stihl designed the TS 400, Stihl knew that toothed wood cutting saw blades were being mounted on Stihl cut-off saws (Linsbauer # 1, pp. 62-63, 66). Linsbauer testified that at the time Stihl designed the TS 400, Stihl knew that the mounting of woodcutting blades on cutting off saws was a common misuse occurring in their market and that it was a very dangerous misuse. Elsner confirmed Linsbauer's testimony. Stihl put the warning to not mount toothed wood cutting blades on the TS 400 in the manual because Stihl knew people were doing so (Linsbauer # 1, pp. 63, 66).

6.25 There is nothing that precludes the installation of woodcutting toothed blades on the TS 400. It is reasonably foreseeable that woodcutting saw blades will be installed on this TS 400 as it readily accepts these saw blades. There is nothing about the installation process that gives the installer a cue that the use of these saws with those blades is inappropriate. It is reasonably foreseeable that woodcutting saw blades will be installed on TS 400 saws and utilized to cut wood and other soft, weak materials such as HDPE plastic pipe.

6.26 Stihl knew, or should have known, of the egregious consequences of a Stihl TS 400 cut off saw with a toothed saw blade installed in it kicking back while cutting HDPE pipe. At least as early as June 8, 2005 there is a record accident of such, Paul Martin Jr.'s that resulted in

<sup>3</sup> # 1: Peter Linsbauer deposition, August 28, 2008.



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litigation (Delaware 1:07-CV-00363-GMS) (Linsbauer # 2, pp. 52). Stihl has an ongoing duty to warn of the TS 400's dangerous and hazardous uses and misuses.

6.27 Those responsible for placing a dangerous and hazardous machine into the stream of commerce are obligated to safeguard persons from the reasonably foreseeable hazards associated with the machine's use, as well as reasonably foreseeable misuses; especially from hazards arising from misuses that were actually known to the designer/manufacture at the time the machine was designed and manufactured.

6.28 Stihl knows: these machines produce dangerous "reactive forces", are applied in cuts and utilized in conditions that will, or likely will, result in kickbacks; and some of these situations are latent. Stihl, has had a history operators being severely injured, including fatally, by Stihl cutoff machines kicking back. There is nothing in the design of this saw to prevent an operator from being struck by the saw instantaneously in the event a kickback occurred.

6.29 Stihl knew that installation of toothed saw blades on its cutting off machines, and persons being injured by such, was an ongoing problem (Anthony Pullins injury, 2001, Court of Common Pleas, 2003; U.S. Eastern District of Pennsylvania 2:03-cv-05343), severe injuries resulting from kickbacks when toothed saw blades are installed in its cutting-off machines from at least 2001 (Kevin Frazer, 286 A.D.2d 661, 730 N.Y.S.2d 124 (2001); Fernando Elias, New York 7:04-cv-08173, October 3, 2003; Paul H. Martin, III et al v. Andreas Stihl AG & CO.KG, et al.).

6.30 At the time of McGee's injuries, Stihl was aware that its TS 400 demo saws have kicked back, struck their operators, causing severe, permanent injuries (McGee, Stout) and even death (Mario Orozco, Dale Erb, James Grove, 2004).

6.31 There are a great number dangerous and hazardous machines capable of causing severe and permanent debilitating injuries utilized in many industries. Those responsible for placing a dangerous and hazardous machine into the stream of commerce are obligated to safeguard persons from the reasonably foreseeable hazards associated with the use of that machine.

6.32 In 1955 The National Safety Council published the Hierarchy of Safety Controls.<sup>4</sup> It is a statement of the order of priority of the steps to be put into effect in order to control hazards of a manufactured product. Beginning with the highest priority and descending to the lowest, this hierarchy is:

1. Design the hazard(s) out of the product. If this is impractical then:
2. Guard the hazard(s). If this is impractical then:
3. Warn the user as to the product's dangers and instruct the user of the steps necessary to be taken in order to safeguard against its hazard(s).
4. If the hazard(s) still exist then personal protective equipment must be utilized.

<sup>4</sup> National Safety Council, Accident Prevention Manual for Industrial Operations, 3d Edition, Chicago, 1955, p. 4-1.

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This hierarchy is well accepted by safety professionals.<sup>5</sup>

6.33 National Safety Council wrote in 1959:

A hazardous mechanical condition or exposure is one which has caused or could cause an injury. If a method of guarding such a condition is known, there is no valid reason for not using it. Absence of injury from operating an unguarded or partially guarded machine for a period of time is no proof that the moving parts of the machine are not dangerous.<sup>6</sup>

6.34 Willie Hammer also stated in 1976:

Identification is a method of accident prevention involving relationships between personnel and hardware. In almost all instances the intent of identification is to attract or focus attention of an operator or other person on the item that constitutes or could generate the hazard. There are numerous examples of its use, and misuse, since identification is often employed to point out the hazard instead of eliminating or minimizing it through improved design.<sup>7</sup>

6.35 Willie Hammer also stated in 1993:

A warning label should not be used as a substitute for good design.<sup>8</sup>

6.36 A manufacturer of machinery having dangerous hazards has a duty to design such products for their reasonably safe use, and also a duty to warn of the product's dangerous hazards. However, a manufacturer cannot dispense with its duty to provide a reasonably safe product by substituting a warning sticker in place of technologically and economically feasible designs. Stihl cannot substitute warnings in place of a technologically and economically feasible design that precludes installation of toothed, wood-cutting saw-blades, on its demo saws in order to safeguard users from the dangerous hazards involved with using this demo saw with such saw blades.

6.37 Stihl has the duty to equip these saws with technologically and economically feasible safeguards in order to protect operators from dangerous and hazardous kickbacks. Stihl installs emergency chain brakes as standard, integral equipment on their chainsaws. Chainsaw injuries resulting from kickbacks declined drastically since the chainsaw industry adopted the emergency chain brakes as standard. Chainsaw emergency brake technology is transferable to these cutoff saws. Blade brake development costs would be spread over the entire demo saw line's world wide market as the technology would not be limited to the TS 400 only. Brakes would be applicable to the entire product line. The actual additional piece part cost would not be an appreciable increase in the approximately \$800 - \$ 1000 machines. The overall net cost increase per saw when considering savings due to reduction of injury

<sup>5</sup> Barnet, Ralph A., Brickman, Dennis, "Safety Hierarchy" Triodyne Inc., Niles, Illinois, 1985.

<sup>6</sup> National Safety Council, Accident Prevention Manual, Chicago, 4<sup>th</sup> Edition, 1959, pp. 23-1 thru 23-3.

<sup>7</sup> Hammer, Willie, Occupational Safety Management and Engineering, Prentice-Hall, Inc., Englewood Cliffs, 1976, p. 135.

<sup>8</sup> Hammer, Willie, Product Safety Management and Engineering, 2<sup>nd</sup> Ed., American Society of Safety Engineers, Des Plaines, 1993, p. 96.

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and disability costs would be relatively minimal. Stihl's design of the incident TS 400 is defective, unreasonably dangerous and not fit for its intended use as it lacks an emergency blade brake.

6.38 It is substantially certain that had Stihl designed this TS 400 demo saw with an emergency blade brake to halt the Oldham toothed saw blade's rotation when the TS 400 kicked back, McGee would not have suffered the injuries he did in this accident. Stihl should have equipped this TS 400 with an emergency brake, similarly as they have done on their chainsaws. Stihl's defective design of this TS 400 demo saw was a substantial cause of McGee's injuries.

6.39 EN 1454:1997 is the European Safety Standard for Portable, hand-held, internal combustion demo saws. It was approved by the European Committee for Standardization (CEN) in 1997. Germany is a member of CEN. DIN EN 1454:1997 is the German designation of this safety standard. EN 1454:1997 applies to the incident Stihl demo saw. EN 1454:1997 reflects safety principles and design technology that were known in the engineering, safety and design communities at least ten years prior to the manufacture of the incident TS 400.

6.40 Section 5 of EN 1454:1997 requires that these machines shall comply with European Standard (CEN) Safety of Machinery – Basic Concepts, General, Principles for Design, Part 1, EN 292-1:1991, and Part 2, EN 292-2:1991. Section 2.12 of EN 292-1:1991 states that the intended use of a machine includes its reasonably foreseeable misuse. EN 292-2:1991 identifies risk reduction by design as avoiding a hazard by suitable choice of design features. Risk reduction can be accomplished by making machines inherently safe by the shape and relative location of mechanical components (§ 3.2, EN 292-2:1991).

6.41 Stihl's TS 400 design does not configure the shape of its mechanical components, i.e. arbor/flange/mount, so as to preclude the installation, and operation, of toothed saw blades, in order to make the machine reasonably safe from the risks of cutting with a toothed saw blade installed. Linsbauer testified that the wood cutting industry does not use shaped arbors (# 1, pp. 70, 72). His testimony is inconsistent with actual practice. As referenced above, Skil manufactures a hand held saw having a diamond shaped arbor (Skil HD5860) and Norton (ST. Gobain) manufactures abrasive disk with matching diamond shaped bores.

6.42 Stihl designed the TS 400's wheel guard so it can be pulled back and thereby exposing the wheel's upper quadrant because exposure of this area is necessary for some cuts. Stihl does not prohibit cutting with the wheel's upper quadrant. Stihl anticipates cutting with the upper quadrant and permits it (TS 400, p. 14). A recommended cutting technique "to and fro" (TS 400, p. 13) is moving the blade back and forth through the cut. Stihl knew that during deep cuts, for which this machine is intended, the blade's upper quadrant could be deep in the cut and likely contact the material. If the wheel's upper quadrant gets pinched during a cut a kickback will likely occur.

6.43 The very existence of Stihl's warnings against cutting with this portion demonstrates that Stihl knew that cuts would be made with this portion of the blade, whether intentional or unintentional. However, Stihl does not warn to never use the wheel's upper quadrant (Linsbauer # 1, pp. 121-122). The only way to absolutely prevent cutting with the exposed upper quadrant is to encase it in a guard. Stihl has never manufactured a guard that

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completely encloses both the upper and lower portions of the wheel, or blade. Linsbauer knows of no manufacturer that has ever made a cut-off machine with such a guard (Linsbauer # 1, p. 123).

6.44 Since Stihl chose not to preclude cutting with the upper quadrant of a cutting wheel, or blade, it should have equipped these saws with a blade brake to stop/slow blade rotation during a kickback. Stihl's design of its TS 400 saws is defective as it allows for cutting with the cutting attachment's upper quadrant which was known to produce kickbacks, yet failed to include a blade brake to stop/slow the blade's rotation during such kickbacks. By doing so Stihl chose machine utility over operator safety.

6.45 The incident Stihl TS 400 demo saw is not inherently safe from the hazards associated with cutting plastic pipe with a toothed saw blade installed on it. Its design fails to include/incorporate features that would preclude the installation of a toothed saw blade on it. The design of this Stihl demo saw fails to comply with § 3.2 EN 292-2:1991, and fails to comply with the generally accepted and technologically feasible principles of design and product safety that were known in the engineering and safety communities at the time this machine was designed and manufactured, as it does not configure the shape of its mechanical components, i.e. arbor/flange/mount, so as to preclude the installation of toothed saw blades and its dangerous operation with those blades. The design of the incident Stihl demo saw is defective as it fails to include provisions making it inherently safe from the reasonably foreseeable risk of its use with toothed saw blades.

6.46 Stihl should have designed the incident demo saw to be inherently safe from the hazards associated with utilizing it with a toothed saw blade, by configuring the machine's design so as to preclude the installation of such blades. Had Stihl designed this demo saw to conform with § 3.2 EN 292-2:1991 by configuring the shape of the arbor/flange/mount arrangement so as to preclude the installation of toothed saw blades, Robert McGee would have been inherently safe from the risks involved with utilizing it with a toothed saw blade and his injuries would not have occurred.

6.47 Willie Hammer is a Professional Engineer who has received the President's Award for System Safety Achievement from the System Safety Society. Mr. Hammer authored a number of books and articles on safety, including a U.S. Air Force manual on missile safety. Mr. Hammer wrote in 1976:

It is up to the safety engineer to determine where all hazardous conditions exist, using standards only as a source of information regarding where and what types of hazards might exist. Then action should be taken to either eliminate or control them, again, using standards only as a guide.<sup>9</sup>

6.48 Gilbert Marshall authored Safety Engineering, an engineering text that addressed the impact designing has on the safety of working people. He wrote in 1982:

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<sup>9</sup> Hammer, Willie, Occupational Safety Management and Engineering, Prentice-Hall, Inc., Englewood Cliffs, 1976, p. 66.



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... a designer should not regard a standard as a design goal. Rather, standards should be used as guides, and in most cases regarded as minimum, not optimum conditions.<sup>10</sup>

6.49 R. Mathew Seiden heads the Seiden Group, Inc., a safety-engineering, management and economics consulting firm. He wrote in 1984:

When an existing safety code or standard does not contain any provisions relating to certain reasonably foreseeable hazards, the burden is on *you*. Do not permit code limitations to stand in the way of designing, producing, and marketing a reasonably safe product, even if you don't like it.<sup>11</sup>

6.50 Alternative designs, having shaped arbor/flange/mounting arrangements that would preclude the installation of the Oldham toothed saw blade on this TS 400 demo saw exist, had it been so equipped. One such design is polygon shaped arbors (e.g., Skil HD5860 diamond shape arbor, Parts Schematic attached).

6.51 Linsbauer testified that ANSI safety standard requires round openings. ANSI B175.4-2006 has no such requirement. Even if Linsbauer's interpretation of ANSI B175.4-2006 was correct, the use of a larger, non-standard, diameter would have precluded the installation of the incident Oldham blade.

6.52 Linsbauer testified that ANSI standards are not law and designers are not limited to them (# 1, p. 64). ANSI standards do not represent a benchmark for safety. They are not intended to represent the best conditions attainable by modern engineering practices. Rather, they reflect agreement on a minimum level of criteria for the safety of manufactured products. Adherence to an ANSI standard does not mean that a machine is safe or designed with available safeguards, as ANSI standards are minimum standards. Further, ANSI standards do not prohibit, nor restrict manufacturers from exceeding the minimum and designing their product with safeguards not required by the standard. ANSI B 7.5-1990 states:

The existence of an American National Standard does not in any respect preclude anyone, whether he has approved the standard or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standard.<sup>12</sup>

6.53 Stihl did not test any shaped arbors that were not round (Linsbauer # 1, p. 70). Stihl never did theoretical or actual investigations on how non-round arbors would affect the operation of these demo saws or cutting attachments (Linsbauer # 1, pp. 71-75).

6.54 Another alternate design is dowel pins installed in the arbor flange, oriented parallel to the arbor, that protrude through corresponding holes in the blade and the removable flange,

<sup>10</sup> Marshall, Gilbert, Safety Engineering, Brooks/Cole Div., Wadsworth, Belmont, 1982, p. v.

<sup>11</sup> Seiden, PE, CSP, CPSM, R. Mathew, Product Safety Engineering for Managers, Prentice-Hall, Englewood Cliffs, 1984, pp. 196-197.

<sup>12</sup> ANSI B7.5-1990, American National Safety Code for the construction, use, and care of gasoline-powered, hand-held, portable, abrasive cutting-off machines. Grinding Wheel Institute, American National Standards Institute, 1990.



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in a manner similar to the pin design utilized for some diamond concrete cutting blades. The arrangement of these pins would preclude the installation of toothed saw blades, which do not have accommodations for such pins. Pin driven blades are currently utilized on concrete and earth cutting saws and also in wood cutting. Stihl never did theoretical or actual investigations on how pin drives would affect the operation of these demo saws or cutting attachments (Linsbauer # 1, p. 81).

6.55 ANSI B7.1-2000, the American National Standard Safety Requirements for the Use, Care and Protection of Abrasive Wheels is an industry consensus standard for reinforced abrasive cutting-off wheels such as those used on Stihl demo saws. It provides for abrasive wheel having metal centers. See Attachment (Arrow).

6.56 Abrasive wheels can arranged to fit shaped arbors or pin drives and not prevent wheel slip between the drive flanges by a metal center conforming to the drive's configuration, that has formed collars that would be pressed against the sides of the wheel at its bore.

6.57 An alternative cutting-off machine blade/drive design, ring saw blades (Partner K750 and K950) is available in the market. Had Stihl designed the TS 400 with a ring saw blade, it would not have been possible to mount the incident Oldham toothed saw blade on it and McGee's injuries would not have occurred.

6.58 Another alternative design is simply a larger diameter arbor. The TS 400's wheel flanges are approximately 4 inches in diameter and have a bearing surface at their periphery of approximately  $\frac{3}{4}$  inch. This leaves up to approximately  $2\frac{1}{2}$  inches of diameter that Stihl could have utilized for an arbor. § 3.3.1 of ANSI B 7.1-2000 (Abrasive Wheels) states that the use of larger spindles is often desirable. Stihl could have equipped this saw with a  $1\frac{3}{4}$ , 2,  $2\frac{1}{4}$  inches, a 40, 45, 50, 55 millimeter (mm) diameter or any diameter it chose less than the  $2\frac{1}{2}$  inches for the saw's arbor that did not correspond to commercially available toothed saw blades. A saw blade having a 1 inch diameter bore cannot be mounted on a  $1\frac{3}{4}$ , 2,  $2\frac{1}{4}$  inches, a 40, 45, 50 or 55 mm diameter arbor.

6.59 Stihl never experimented with a cut-off machine having an arbor greater than one inch (Linsbauer #1, p. 78). Linsbauer testified that larger arbor diameters have no effect on the safety of a cutting machine (Linsbauer #1, pp. 78, 79). Linsbauer testified that a larger diameter would no effect on the utility of the TS 400.

6.60 Had Stihl designed the TS 400 with a larger, non-standard arbor diameter that precluded the installation of the incident Oldham toothed blade, having a one inch diameter bore, McGee's injuries would not have occurred. In order for a toothed saw blade to be utilized on a Stihl arbor with such a larger non-standard diameter, a manufacturer would have to intentionally make a toothed saw blade with such a non-standard, larger bore that had no other application besides its dangerous utilization on a Stihl demo saw. If there was a market for such dangerous blades it would likely be so small it would be uneconomical to make or buy such blades.<sup>13</sup>

6.61 Linsbauer testified that if there was a safe technical solution to avoid the installation of wood cutting blades on their saws they would have done so (# 1, p. 66). However, safer

<sup>13</sup> Saw Blade and Handsaw Manufacturing: 2002, 2002 Economic Census, US Census Bureau, U.S. Department of Commerce, 2004.

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technical solutions that would have not added in any material way to the cost of the TS 400 and would not have impaired its utility in any way, existed at the time Stihl designed its TS 400 that would have precluded the installation of toothed saw blades on the TS 400, however Stihl chose not to utilize any. Instead, Stihl chose inadequate warnings as a substitute for available safe technical solutions. Had Stihl chose a safe technical solution to preclude the installation of the Oldham blade on this TS 400 demo saw, McGee's injuries would not have occurred.

6.62 The design of the incident Stihl demo saw is defective as it fails to include technologically feasible and available features/provisions that would have precluded the reasonably foreseeable installation of a toothed saw blade on it, and its use with same installed, which features/provisions would not have added materially to the cost of the TS 400, nor impaired its utility.

6.63 The workday's activities and stresses can distract a worker's attention from a product's dangerous hazard. A person's lack of recognition of a product's hazards could result in severe injury, or worse. A warning is the vehicle through which a manufacturer communicates the risks involved with the use of its product having dangerous hazards to its users, as well as the means to avoid/safeguard those risks.

6.64 A manufacturer has a duty to warn of the dangers inherent in using its product, and instruct users as to how to safeguard themselves and others from those dangers. A manufacturer also has a duty to warn of the dangers of the reasonably foreseeable misuses of its products and certainly of the dangerous misuses of which it knows is commonly done by users of its product.

6.65 Manufacturers commonly warn of their product's dangerous hazards in manuals. Warnings in manuals, however, are not sufficient to warn of a product's hazards. Operators need to be constantly reminded of the hazards while on the job, less they become oblivious to them. Workers using industrial tools are unlikely to own such tools and therefore unlikely to come in contact with, or have opportunities to read the owner's manual if it is not stored on the machine. They are particularly in need of such constant reminders.

6.66 Manufacturers need to display prominent warnings on the product itself, as a constant reminder of its hazards. Safety signs and labels should be placed on a product such that they will be readily visible to the user during normal interaction with the product. Warnings commonly include pictograms (pictographs, pictorial/symbolic warnings) in order to facilitate their understanding. Pictograms can promote greater and more rapid communication of the safety message, and therefore, greater safety for the general population.<sup>14</sup> A pictogram serves as a constant, instantaneous reminder of the safety message that does not require the viewer to engage in the conscious act of reading as a textual warning does. Pictograms "should provide the viewer with an immediate opportunity to recognize an existing hazard."<sup>15</sup> See FMC Pictorial # 036, attached.<sup>16</sup>

<sup>14</sup> ANSI Z535.3-1991, American National Standards Institute, New York, 1991, p. 1.

<sup>15</sup> ANSI Z535.4-1991, 11.1, American National Standards Institute, New York, 1991, p. 7.

<sup>16</sup> Product Safety Sign and Label System, 1990, FMC Corporation, Santa Clara, p. 7-2.

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6.67 The installation of visual hazard-alerting messages to inform observers of a hazard, the degree of the hazard, and the appropriate actions to take to avoid injury is a longstanding safety principle and practice.<sup>17</sup>

6.68 In 1980, FMC Corporation produced a manual on safety signs. It has been well received by safety professionals and is referred to in OSHA regulations<sup>18</sup> and in the American National Standard Criteria for Pictograms.<sup>19</sup> FMC stated:

Written communication can be confusing. The same words can have different meanings to different people, especially when used in more than one context. Words can also become an inadequate means of communication when over used or misused. Disparities in reading skills and/or comprehension of a specific language complicate the effectiveness of written communication even further.

When words are used to help minimize the occurrence of accidents, the limitations associated with written words present serious communication problems.

It is therefore important to supplement written communication with pictorial or symbolic language when possible which can be perceived and understood by a major cross-section of the population, both nationally and internationally.

... When such safety signs or labels are placed on products in appropriate locations, they should help to minimize the occurrence of accidents due to latent product hazards.<sup>20</sup>

6.69 FMC Corporation reiterated this information in 1990<sup>21</sup>; as did ANSI Z535.3-2002<sup>22</sup> in 2002.

6.70 Stihl has affixed warning stickers to the installation side of the TS 400's wheel guard. No such warning sticker was on this TS 400. Jingoli had a number of Stihl TS 400 saws that did not have warning labels on their guards. Jingoli experiences with the TS 400 label was such that it kept a supply of replacement stickers in its maintenance department.

6.71 Stihl TS 400s are commonly exposed to harsh conditions. Sound engineering and design principles dictate label durability for the product's intended environment. Missing warning labels provide no warning at all. Construction, demolition and firefighting occur in rain, snow, night, inside buildings and structures, in trenches, under culverts, etc., in gritty, harsh conditions. Section 8.1.2 of EN 1454:1997 requires that markings be durable and resist anticipated service conditions. Equipment utilized in such conditions is often exposed to harsh cleanup methods such as power washers, steam cleaning, acidic and caustic cleansers.

<sup>17</sup> American National Standards Institute, Inc., American National Standard for Environmental and Facility Safety Signs, ANSI Z535.2-1991, p. 1.

<sup>18</sup> 29 CFR 1910.145(f), Appendix B 9.

<sup>19</sup> ANSI Z535.3-1991, 9.2.4, p. 18; ANSI Z535.3-2002, 9.4, p. 16, American National Standards Institute, New York.

<sup>20</sup> Product Safety Sign and Label System, 3<sup>rd</sup> Edition/January 1980, FMC Corporation, Santa Clara, p.1-1.

<sup>21</sup> FMC Corporation, Product Safety Sign and Label System, Forward, Santa Clara, 1990, p.1-1.

<sup>22</sup> American National Standards Institute, American National Standard Criteria for Pictograms ANSI Z535.3-2002, New York, p. 1.

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6.72 Stihl TS 400 saws can discharge dust, dirt, debris etc. that can coat, foul, obliterate, obscure and otherwise destroy warning stickers mounted on their guard. See attached. Stihl knew that TS 400 are commonly used in pretty rough conditions, rigorous environments and their labels can be damaged during normal use (Linsbauer # 2, pp. 42-43, 55). The TS 400's anticipated environment should also include harsh cleaning methods commonly utilized to clean them of their typical contaminants.

6.73 Willie Hammer stated, with regard to labels, in 1993:

Labels should be affixed as permanently as the normal life expectancy of the equipment on which they are to be placed.<sup>23</sup>

6.74 It is the custom and practice to install warning labels sufficiently durable for the environment of their intended use. An example of this practice is requirement 5.11.3.1 of ANSI B175.1-2000, Safety Requirements for Gasoline-Powered Chain Saws (a normative reference for ANSI B175.4-2006), which states:

All chain saw powerheads shall be clearly and *durably* (emphasis added) marked with the following verbatim or suitable paraphrased statements (pictorial or graphic illustrations may be used in lieu of or in addition to written statements ...

6.75 Linsbauer testimony that the TS 400 labels are durable and designed for the lifetime of the machine (# 2, pp. 42-44) is not supported by Jingoli's experience, nor by an internet survey of available used machines. Linsbauer testified that Stihl labels met the requirements of UL/ANSI (sic) 969 (American National Standards Institute/Underwriters Laboratory Standard for Marking and Labeling Systems). ANSI B175.4-2006 § 8.1.1 states that *IF* (Emphasis added) adhesive labels are used, they shall comply with ANSI/UL 969. ANSI/UL 969 requires adhesive-attached labels to achieve permanence and legibility in their product's intended environment.

6.76 Stihl knew, or should have known, that the adhesive plastic film warning labels it installed on the TS 400 was not sufficiently durable, nor fit for the TS 400's intended use. Stihl knew, or should have known that whatever warnings it had on this demo saw's original sticker could quickly become useless if the sticker could not stand up to the saw's environment. Stihl's design should have included durable labels fit for the TS 400's reasonably foreseeable use, such as metal labels secured with metal fasteners.

6.77 By utilizing such an unfit label Stihl virtually assured that a number of operators and saw blade installers would fail to benefit from any warnings Stihl might include on such a sticker. At the time of this incident, Jingoli employees, including McGee and blade installers, were deprived of the benefit of any warning Stihl might have included on such an unfit label, whatever it might be, as that label was not on the saw. Stihl's design of its warning label sticker for its wheel guard is defective as it is not fit for the TS 400's intended use.

6.78 Manufacturers and sellers have an ongoing duty to warn purchasers of latent dangers of their products and of reasonably foreseeable misuses of their products. Manufacturers, distributors and sellers of machines such as this TS 400 demo saw, should expect these

<sup>23</sup> Hammer, Willie, Product Safety Management and Engineering, 2<sup>nd</sup> Ed., American Society of Safety Engineers, Des Plaines, 1993, p. 96.



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machines to be used by untrained and partially trained users, as these machines are readily available in the market place to anyone, trained or not; and design the machines and its warnings for such users.

6.79 The results of four experiments performed by Godfrey, Rothstein and Laughery in 1985 demonstrated that warnings can be effective but not unless they are well designed in appearance and content.<sup>24</sup> They showed that enhancing warnings with pictorials, color and size increased their effectiveness.

6.80 The hierarchy for on-product warnings is to list warnings having the most egregious consequences first as readers do not necessarily read completely through to last item.

6.81 In order to transmit the manufacturer's message to the user a warning must be designed and installed on a product with adequate conspicuity. Conspicuity is the reasonable certainty of perception, without search, in a short time, of an on-product warning. A warning's conspicuity should be commensurate with the hazard's potential consequences. Conspicuity is effected by color contrast, brightness level, relative sizes, apparent movement, and stimulus novelty.

6.82 Peters and Peters stated in 1999:

Some warnings are buried in other text or are so small they cannot be discerned as a special warning. If a warning is not as conspicuous as it could be or should be, then the warning has less risk-reduction than it could have.<sup>25</sup>

6.83 Stihl has installed a textural warning sticker on other TS 400 demo saw wheel guards (Exhibit: McGee 1, 10/27/08; Attached). It is oriented so its text is aligned vertically, approximately perpendicular to the normal reading plane when the machine rests on grade. The sticker contains twelve separately numbered items, oriented in two columns having approximately 40 lines of text. Item 8 is about half way through the total text, in the second column, following a number of technical items that are not warnings. Item 8 states:

8. Use only abrasive wheels, including abrasive diamond wheels. This machine is not a circular saw. It is not equipped with the guarding appropriate for a circular saw and is not designed to cut wood. Never use carbide-tipped, wood-cutting or other metal blades – they can cause severe or fatal personal injury from reactive forces, blade contact or thrown tips.

6.84 The potential consequences of using a TS 400 with toothed saw blades are extremely egregious, yet Stihl buried its warning in the second column of small, lengthy text, the same size as that preceding it, in the eighth item in its list. The consequences of violating this warning can be severe and even fatal yet Stihl's warnings on this machine lack the conspicuity commensurate with those consequences.

6.85 Research has shown that warning who's violation can result in severe consequences should be placed at the beginning of a list of warnings, not further down the list, as readers

<sup>24</sup> Laughery, Kenneth R., Wogalter, Michael S. and Young, Stephen L., Eds. Human Factors Perspective on Warnings, Human Factors Society, Santa Monica, 1994, p. 67.

<sup>25</sup> Peters, George A. & Barbara J., Warnings, Instructions, and Technical Communications, Lawyers & Judges Publishing, Santa Monica, 1999, pp. 246-247.



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do not necessarily completely read the entire list. Stihl should have placed this warning higher up the list. The attached Stihl warning demonstrates the feasibility of doing so. Stihl's design of its warnings is defective as it fails to place this critical warning earlier in the text.

6.86 Research has shown that statements that warn what to avoid are more effective than states instructing what to do with the product. Still should have begun this item with:

Never use carbide-tipped, wood-cutting or other metal blades – they can cause severe or fatal personal injury ... ;

rather than burying it in the middle of the sentence.

6.87 Research has reported that two negatively worded warning are more likely to be complied with than positively worded warnings. Had Stihl have placed two warnings against the toothed saw blades on this TS 400, it would have likely been noticed like the Stihl logo has been.

6.88 Virtually all parties associated with this incident saw knew it was a Stihl product. Stihl's brand is conspicuous in its prominent approximately ½ inch high lettering in two locations, yet none of them knew of Stihl's warning against toothed saw blades. All parties who have handled Stihl TS 400 saws who's depositions I have read, were also unaware of Stihl's on-product warning against toothed saw blades. Had Stihl made its warning against toothed saw blades as reasonably conspicuous as its brand, it is substantially certain that warning would have been observed by McGee and/or other Jingoli employees and McGee's injuries would not have occurred. A cause of McGee's injuries was Stihl's failure to make its warning against toothed blades sufficiently conspicuous.

6.89 Kenneth R. Loughery, Sr. wrote in 1993:

The "everybody knows" problem is essentially this: Engineers, architects, and designers of other stripes often design products and environments that have associated safety problems -- hazards. The safe use of these products requires some knowledge or information on the part of users, which the users -- at least some of them -- may not or do not have. The design process frequently includes little or no attention to the knowledge requirements of users and/or the knowledge state of users. Worse still, where knowledge requirements are addressed, inappropriate assumptions are often made as to what people know or what they will do, and seldom is any effort made to assess whether or not such assumptions are valid.<sup>26</sup>

6.90 McGee thought the Read Manual pictogram meant to consult the manual if he had a problem. The most effective warning is the pictogram-text combination. The Read Manual pictogram should have been accompanied by a textural warning.

6.91 Stihl warns of "reactive forces" in item 8., as well as in its manual. McGee had never received nor read a manual for a TS 400 or any other demo saw.

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<sup>26</sup> Gardner-Bonneau, Ed., Daryle Jean, "Ergonomics in Design", Human Factors and Ergonomics Society, Santa Monica, July 1993, p. 9

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6.92 "Reactive forces" sounds like something one missed in high school physics, that is, if one took physics at all. Stihl's use of the technical term "reactive forces" might well be an attempt at legally adequate verbiage, but it does not absolutely communicate the message about the machine's dangerous kickback hazard to likely receivers of this verbiage. The potential for the reasonably foreseeable readers, who might read this warning, to not understand the technical term "reactive forces" in this warning is reasonably foreseeable.

6.93 The © A. STIHL 2000 at the bottom of this sticker suggests that this sticker was written in 2000, preceding ANSI Z535.4-2002. ANSI Z535.4-2002 is the American National Safety Standard for Product Safety Signs and Labels. ANSI Z535.4-2002 sets forth performance requirements for the design, application, use and placement of safety signs and labels intended to identify potential hazards for persons using, operating, servicing or in proximity to a wide variety of products. It applies to this Stihl TS 400 demo saw.

6.94 Section 6 of ANSI Z535.4-2002 specifies that a product safety sign or label consists of a signal word (e.g. WARNING) panel plus a message panel. Section 7.2.2 specifies that the signal word WARNING shall be in safety black letters on a safety orange background. Section 7.3 specifies that the message panel should have either black lettering on a white background or a white lettering on a black background. Stihl's warning sign does not conform to these specifications.

6.95 ANSI Z535.4-2002 refers to ANSI Z535.3-2002, The American National Standard Criteria for Pictograms. It provides guidance for the construction of pictograms. ANSI Z535.3-2002 was approved July 25, 2002. Section 9.4 of ANSI Z535.3-2002 references FMC Corporation.

6.96 Section 8.2.1 of ANSI Z535.4-2002 requires the lettering of the warning signs on the incident Stihl machine to be of a size that enables persons with normal (including corrected) vision, to read this warning sign at a safe distance. ANSI Z535.4-2002, § B3.3.13 recommends a minimum type size .08 inches; for a viewing distance of one foot or less, a mean letter height .084 inch for FAVORABLE reading conditions; and .168 inch height for a viewing distance of two feet. It is reasonably foreseeable that this machine will not always be utilized under favorable conditions.

6.97 Section 12.1 of ANSI Z535.4-2002 refers to Section 12.4 for publications useful in constructing warning signs. It refers to calls out Sidney Smith's study, *Letter Size and Legibility*, circa 1978, of the minimum distance required to achieve legibility of displayed letters. Smith determined that the limit of legibility is a subtended visual angle of 0.0019 radians (7 minutes); and that a subtended visual angle of 0.007 radians (24 minutes) is necessary for virtually 100% legibility of mean letter height.

6.98 The mean letter height in the Stihl warning sign affixed to the demo saw's blade guard was measure to be approximately .059 inch. Applying Smith's findings to this sign requires it be viewed at a distance no greater than approximately 8 ½ inches in order to insure 100% legibility to all readers. It is unreasonable to require persons to be as close as approximately 8 ½ inches to this machine in order to be warned of its dangerous hazards.

6.99 At twenty inches, ANSI Z535.4-2002, § B3.3.13 requires (by interpolation) approximately .093-inch minimum letter height for favorable conditions; and recommends approximately .150-inch letter height, also for favorable conditions. By Smith's findings, the

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letter height at twenty inches for 100% legibility should be approximately .140-inch (the "James Bond" rule)

6.100 Section 8.1.3 of EN 1454:1997 requires information and instructions provided by markings shall be clearly readable at a distance of 500 mm (approximately 19 11/16 inches). Linsbauer testified that Stihl's warning stickers are designed to be read at twenty inches. The design of this Stihl cut-off machine fails to comply with Section 5 of EN 1454:1997.

6.101 The Stihl's design of its warning sign is defective as its letter size is too small to adequately communicate its warnings in the reasonably foreseeable environment intended for the TS 400's use. Stihl knew, or should have known, that the letter size of its warning sticker was too small.

6.102 Stihl's warnings are defective and not fit for use on its TS 400. A cause of McGee's injuries was Stihl's failure to adequately warn of the dangerous hazard of operating a TS 400 with a toothed saw blade.


6.103 Sojourner and Wogalter stated, in their paper The Influence of Pictorials on the Evaluations of Prescription Medication Instructions :

When used to augment textural information, pictorials have been shown to capture attention while facilitating comprehension and memory. ... In addition, consumers generally believe pictorials are helpful and should be used to convey critical information.

6.104 The Organization for the Safety of Abrasives (oSa) created a pictogram warning for cutting attachments (i.e. blade) that are not suitable for hand held machines. See attached.

6.105 The incident TS 400 demo saw has seven safety pictograms affixed to it on its left side (Inspection Observation 5.6). The third pictogram from the right, containing the prohibition symbol, warns of operating with a cracked or broken wheel. The second from the right warns of the saw's greater propensity for kickback if cutting is done in the cutting attachment's upper quadrant. Stihl knew of the dangerous hazards associated with toothed saw blades on this TS 400, yet chose to not install a pictogram warning of it on the saw. It did so despite having one in its instruction manual; and despite the fact that a competitor, Makita, installs one on its 14 inch demo saws. There is no justifiable reason for Stihl's failure to install such a pictogram on the TS 400.

6.106 Stihl should have installed a pictogram on the incident TS 400 warning against the installation of toothed saw blades. Such a pictogram could be constructed by combining a saw blade symbol, such as in FMC Pictorial # 036, attached, with ANSI Z535.3-2002's

prohibition symbol, . See ANSI Z535.3-2002, § 8.4 Prohibition Symbols, also ISO 3864-1984, Safety Colours and Safety Signs, § 8.1, p. 3, attached.

6.107 Stihl's design of the incident TS 400 warnings is defective as it fails to include a pictogram warning against toothed blades.

6.108 Stihl is a member of the Masonry and Concrete Saw Manufacturers Institute (S.M.I.). The S.M.I. disseminates a Warning sign for abrasive demo saws that illustrates the format

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and color scheme required by ANSI Z535.4-2002. See attached. Stihl's warning signs do not conform to the S.M.I. warning sign's format and color scheme. Stihl's design of its warnings for the incident TS 400 demo saw is defective as it fails to conform to ANSI Z535.4-2002.

6.109 In order to remove and/or install a blade on this cut off machine, an operator will face the spindle-nut side of the guard and contact the machine's spindle nut. Stihl cannot be certain that a person installing a toothed saw blade on the TS 400 has read the manual. A conspicuous pictogram, of sufficiently durable material, accompanied by a textural warning, should be mounted on the guard so that an installer of a toothed saw blade will be alerted to the dangerous hazards of toothed saw blades on the saw. The warning's text should be a size sufficient to be read by an average reader at least approximately two feet from the saw. A second pictogram should be mounted on the top of the saw (See attachments) where an operator is likely to repeatedly see it and be constantly reminded of this danger.

6.110 Stihl's warnings on this machine lack the conspicuity necessary to alert operators of its dangerous hazards. Stihl's design of this machine's instruction is defective as it fails to conform to § 7.1 of EN 1454:1997. Had Stihl's warnings been sufficiently conspicuous so as to conformed to EN 1454:1997, § 7.1, they would have readily communicated Stihl's instructions for the safe use of this demo saw to operators.

6.111 Stihl's design of this machine's warnings is defective as it fails to adequately warn against operating it with a toothed saw blade and the severe consequences of such use.

6.112 For some time, Stihl had singled out two specific warnings in a black box in every section of its website. One was to not use carbide tipped, toothed saw blades on Stihl demo saws. Stihl, recognized the potential grave and permanent consequences from this dangerous, latent hazard, yet did not install a pictogram to enhance its inconspicuous, obscure and benign textural warning on its yellow sticker.

6.113 Warning stickers on the TS 400 instruct the user to read the manual. McGee testified that he was never given a manual for a TS 400 or any other demo saw. However, he remembered the Stihl pictogram installed on the saw depicting a manual and testified he thought it meant to refer to the manual for any special instructions (# 2, p. 77).

6.114 In order to read the owner's manual, an operator must have access to it. The need to consult the manual when this machine is at a jobsite is reasonably foreseeable. Owner's manuals typically do not accompany such portable equipment to the jobsite. Rather they are commonly left in a file cabinet or a storage area, even misplaced or lost unless provision are made for it to remain with the portable equipment. Manuals are typically not available with machines if they are not stored on the machine. The need for operator manuals to accompany a machine on the construction jobsites has been well known for considerable time prior to this incident machine. David K. Merrifield, director of quality and product safety for Snorkel, an aerial work platform manufacturer, and Frank Schimanek, an attorney, wrote in 1998:

Because the operator manual contains information vital to the safe operation of the machine it should be readily available to the operator.<sup>27</sup>

<sup>27</sup> Schimanek, F., Merrifield, D.K., Aerial Work Platforms: Safety, Liability and the Rental Center, "Professional Safety", V. 43, No.1, American Society of Safety Engineers, Des Plaines, January, 1998, pp. 27-28.



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6.115 It is reasonably foreseeable that demo saw operators and saw blade installers will learn through on-the-job training; and many of them so trained will not read the manual, especially if the manual is not with the saw.

6.116 It is reasonable foreseeable that machinery users will not necessarily read every manual for every machine they utilize. Research suggests that when people believe they are familiar with a product they are less likely to read its documentation and warnings. Stihl knew, or should have known, that machinery users will not necessarily read every manual for every machine of a type they have experienced before, nor will they retain everything they do read.

6.117 McGee had approximately twelve years experience using demolition (concrete cut-off) saws (# 2, p. 80). For brand new equipment he never used before, McGee would go through its manual, not necessarily every word, word-for-word, depending on what he retained (# 2, pp. 78-79). If it's a new piece of a type he has used before and he is comfortable in using it, he would probably not read the manual unless there was an alteration on it. This typical scenario illustrates the importance of on-product warnings and why manufacturers cannot rely on owner's manuals to communicate their warnings to users of industrial tools.

6.115 Stihl can not be certain that an operator, or a saw blade installer, will come in contact with the owner's manual. Stihl can only be certain they will come in contact with the machine; nothing else. The only vehicle Stihl can rely upon to transmit its warnings regarding is the machine itself. If the manual is not with the machine, Stihl can not depend on warnings that are in the manual to reach the operator or a saw blade installer. Lack of on-machine storage deprives persons of opportunities to consult the manual in the field. Stihl should have equipped the TS 400 with a hollow storage sleeve in the machine's handle or a compartment integral with the machine's housing to store a rolled up manual. Portable and mobile construction equipment, such as roofers' ladder-lifts, aerial buckets and rough terrain forklifts, are equipped with onboard manual storage compartments. Even home appliances such as washers and driers often have storage compartments for their manuals.

6.116 The design of this machine should include a storage compartment for the manual so it is readily available to operators and saw blade installers on the jobsite. Stihl's design of the incident TS 400 demo saw is defective as it does not include a storage compartment for its manual.

6.117 It is reasonable to expect that persons who have read the manual might not remember everything in it. It is reasonable to expect that not everyone who reads an operator's manual will recall every warning within it, every time he uses the machine.

6.118 The TS 400's kickback danger with a toothed saw blade is not obvious. It is reasonably foreseeable that TS 400 operators having experienced its power to cut through steel and concrete, would intuitively assume that the TS 400 would easily cut softer and weaker material, especially when equipped with a toothed saw blade. Actually these machines are quite capable of sawing wood. Equipped with a toothed blade it saws through wood far better than an abrasive wheel burns through wood. It is counter-intuitive to the reasonably foreseeable user of this machine that it should not be utilized to cut material softer than concrete and steel, especially when wood-cutting saw blades fit on the machine.



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6.119 The TS 400's kickback danger with a toothed saw blade is counter-intuitive, latent danger. Its consequences are so egregious that a conspicuous warning must be installed in a location on the machine that alerts the operator and saw blade installers as they approach the hazard; every time they approach the hazard.

6.120 Laughery and Brelsford stated in 1991 that authors of safety communications must know their receivers, and design their messages for the audience expected to read them.<sup>28</sup> Leonard, Otani and Wogalter stated in 1999, that there should be a match between the intended meaning of a term and the target population's understanding of it.<sup>29</sup>

6.121 Stihl utilizes the term "reactive forces" on pages six and 13 in its manual and also in its on-product warning sticker. Demo saw reactive forces include rotational, climbing and pulling, and gyroscopic forces.<sup>30</sup> It is reasonably foreseeable that a significant portion of construction workers might have difficulty in comprehending this term, as well as its application to demo saws. Stihl's use of "reactive forces" might well be an attempt at legally adequate verbiage, but it does not absolutely communicate the message about the machine's dangerous kickback hazard to likely receivers of this verbiage.

6.122 Kickback (as distinguished from "reactive forces") is a well know and recognized term associated with saws in construction. Its meaning is virtually self evident. Kickback is a well understood term by construction workers. Stihl utilizes "kickback" approximately 109 times in its 1999 Chain Saw Safety Manual, but failed to use it even once, on the incident cut off machine. It should have used the more understandable term "kickback" in order to warn of such a dangerous event.

6.123 Stihl identifies kickback in its 2007 Cut-off-Machine Safety Manual (p. 13), warns of it (p. 14) and instructs how to reduce it (p. 14).

6.124 Shindaiwa, another demo saw manufacturer utilizes the work KICKBACK specifically in its warning that Kickback may force the cut-off wheel up and back towards the operator lightning-fast.<sup>31</sup> Partner, another demo saw manufacturer also utilizes the work KICKBACK specifically in its warnings and instructions as to how to avoid kickbacks.<sup>32</sup> Makita, another demo saw manufacturer also utilizes the work KICKBACK specifically in its warnings and instructions as to how to avoid kickbacks.<sup>33</sup>

6.125 Stihl's design of its warnings is defective as they fail to use language that adequately identifies this machine's dangerous kickback hazard to its intended and likely foreseeable users.

<sup>28</sup> Laughery, Kenneth R., Brelsford, John W., Receiver Characteristics in Safety Communications, Proceedings of the Human Factors Society 35<sup>th</sup> Annual Meeting, Human Factors Society, Santa Monica, 1991, pp. 1068-1072.

<sup>29</sup> Wogalter, Michael S., Dejoy, David M., Laughery, Kenneth R., Eds. Warnings and Risk Communications, Taylor and Francis, Philadelphia, 1999, p. 153.

<sup>30</sup> ANSI B175.1-2000 § 3.9, p.4.

<sup>31</sup> Shindaiwa Owner's and Operator's Manual EC7500/EC7600 Engine Cutoff Saw (EPA Version), Part Number 68002-94310 Rev. 12/02, p. 5..

<sup>32</sup> K950 Operator's manual, Partner Industrial Products, 1998W45, p.8.

<sup>33</sup> Makita Instructions and Safety Manual for Gasoline Power Cuts, DPC6410, DPC6411, DPC731, DPC 7311, p. 8.

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6.126 Keyla Friedmann has researched the effectiveness of warnings. Friedmann stated in 1988, after the completion of a study of warnings:

If a warning contains appropriate information to make it legally adequate but the information is presented in such a way that it does not influence behavior, then that warning is virtually useless.<sup>34</sup>

6.127 Leslie W. Ball wrote in 1988:

The engineering purpose of a warning system is not to transfer responsibility for an injury from a product manufacturer or facility operator to the victim. It is to change the behavior from unsafe decisions and acts to safe decisions and acts.<sup>35</sup>

6.128 Videos demonstrating safe product use have been utilized to teach safety behavior for products containing dangerous hazards.<sup>36</sup> The efficacy of video warnings has been known for considerable time. Raciot and Wogalter tested the effectiveness of videotape warnings in 1994.<sup>37</sup> The high rate of compliance with video enhanced safety instructions indicated the efficacy of videos in persuading individuals to use safe procedures. Raciot and Wogalter stated in 1994:

While warnings stress the avoidance of unsafe behaviors, behavioral modeling techniques focus on providing guidelines for the use of safe behaviors ...

In the training context, videotapes are often used to teach individuals the importance of safe and unsafe behaviors.

... inexpensive videos might be enclosed with certain consumer products that could better communicate its operational and potential hazards than an instructional manual.<sup>38</sup>

6.129 A DVD training video is available from Stihl regarding the safe and proper application of the cut-off machine. Its price is approximately \$4 - \$5. This DVD is actually a component in Stihl's system of warning users of its demo saws' dangerous hazards. Stihl did not include this \$4 - \$5 video with the \$ 812.50 incident TS 400. By not including this DVD with its demo saws, Stihl relied on other parties, which it may not necessarily have any control over, to alert demo saw purchasers, such as Jingoli, of its existence. McGee and other Jingoli employees were not aware of this DVD prior to McGee's injuries.

6.130 Linsbauer testified he does not know why it is not included with every cut-off machine that is sold. (Linsbauer #1, pp. 102-105). By not including this DVD as part of the incident

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<sup>34</sup> "Proceedings of the Human Factors Society 32<sup>nd</sup> Annual Meeting", 30(4), Human Factors Society, Santa Monica, 1988, pp. 507-515.

<sup>35</sup> Ball, Leslie W., *Journal of Products Liability*, Vol. 11, # 3, Hazard Control by Warnings, Pergamon Press, 1988, pp. 285-291.

<sup>36</sup> Power Tool Accidents They Can Be Prevented, Power Tool Institute, Inc. Cleveland; Woodworking Safety Video, WMIA / WMMA.

<sup>37</sup> Laughery, Wogalter & Young, Eds., Human Factors Perspectives on Warnings, Human Factors and Ergonomics Society, Santa Monica, 1994, pp. 183-185.

<sup>38</sup> Laughery, Wogalter & Young, Eds., Human Factors Perspectives on Warnings, Human Factors and Ergonomics Society, Santa Monica, 1994, pp. 183-185.

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demo saw's product "literature" package, Stihl failed to assure that saw purchasers, such as Jingoli, will receive it and have the opportunity to utilize it to train its employees in the safe use of demo saws. Stihl's failure to include the DVD training video with the incident demo saw was a defect in its product's warnings of the incident demo saw's dangerous hazards.

6.131 Linsbauer testified that Stihl never provided a written curriculum or outline of a written curriculum for employers to train their employees in the safe use of their cut-off machines (Linsbauer #1, p. 100).

6.132 Demo saw manufacturers know, or should know, that many demo saw users learn on-the-job; and that such learning can perpetuate common unsafe misuses of their product. Stihl knows, or should know, that potential construction demo saw users comprise a workforce who's knowledge, experience and capabilities likely cover the full spectrum from none to well experienced in misuses. It is in the interest of demo saw manufacturers for employers to do so, in order to reduce their injury experience. Demo saw manufacturers should provide training guidelines and/or outlines so employers can utilize the manufacturer's information to properly and thoroughly train their employees, especially in demo saw safety. It is reasonably foreseeable that employers might want to train employees in the safe use of Stihl demo saws but not have sufficient knowledge or information to do so. Stihl should have made provided training guidelines and/or outlines so employers, such as Jingoli, can properly and thoroughly train their employees, in safe use of the TS 400.

6.133 The teeth of Oldham's Heavy Duty Construction Carbide 14 inch diameter, 24 Tooth, saw blades have a hook angle of negative five degrees. These blades are typically utilized in a specialized application such as radial arm saws. Fourteen inch radial arm saws typically are stationary saws and are commonly found in lumber yards. Oldham's inclusion of the word "Construction" in the blade's name suggests usage on construction sites. It is not common to find fourteen inch radial arm saws on construction sites. The word "Construction" suggests a market different from radial arm saws. It suggests that Oldham knew these blades would be utilized on demo saws at construction sites.

6.134 The United States Occupational Safety and Health Administration (OSHA) clearly identified on November 15, 1999 the combination of a toothed saw blade, such as this Oldham, Heavy Duty Construction Carbide 14", 24 Tooth, saw blade mounted *on portable abrasive machines, commonly known as cut-off machines*" i.e. demo saws such as this Stihl TS 400, is an unintended use. Had Oldham followed OSHA's lead and provided adequate warnings on its blade, the blade would not have become the necessary element that facilitated this unintended use and McGee's injuries.

6.135 These Oldham saw blades have a one inch bore. It is reasonably foreseeable that persons in construction would utilize Oldham's Heavy Duty Construction Carbide 14", 24 Tooth saw blade on demo saws. Oldham knew of the dangerous hazards associated with such use. Oldham knew its toothed saw blades readily fit on such demo saws. Oldham has the obligation to warn of the installation of its blades on such machines; the dangerous hazards associated with using its toothed, saw blades installed on demo saws.

6.136 Oldham's packaging states that failure to heed its instructions and warnings could result in bodily injury. However, Oldham's packaging fails to warn against installing it on demo saws, or concrete cutoff saws or cut-off machines. Oldham's design of the warnings on its packaging for this Heavy Duty Construction Carbide 14", 24 Tooth saw blade is

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defective as it fails to warn against the installation and use on gasoline powered, hand held, portable, abrasive, demo saws, or concrete cutoff saws or cut-off machines.

6.137 The mean letter height of the text of Oldham's Safety Instructions and Warnings on the packaging for its Heavy Duty Construction Carbide 14", 24 Tooth saw blade is small, approximately 0.050 inch high.

6.138 Oldham, in order to do its part to prevent the misuse of its wood cutting/toothed saw blades on demo saws, should have: installed pictograms indicating such on the blade's packaging and placed its textural warning next to it; and have done the same on these saw blades.

6.139 Oldham did not install a pictogram on this packaging, warning against the installation of these blades on such demo saws. Oldham has installed pictograms accompanied by text on the packaging for its Heavy Duty Construction carbide tipped, twelve inch diameter, twelve tooth blade to indicate suitable blade applications. See Photos # C 03, C 05, attached.

6.140 Attached is a copy of Black & Decker's DeWalt XP, DW4742, 14" Dry/Wet Diamond Blade in its packaging. Black & Decker utilized three different icons, on both the front and back of the packaging, to identify the three machines for which this blade's use is suitable. Notice particularly the size of these icons and their conspicuity. Adjacent to these three icons, once again on both the front and back, Black & Decker utilizes the international prohibition sign (circle with diagonal slash) superimposed over a dripping faucet to indicate that this blade can be utilized without water. The icons are accompanied by explanatory text; which illustrates the efficacy of their mutual bolstering.

6.141 Oldham's design of the warnings on the packaging for its Heavy Duty Construction Carbide 14", 24 Tooth, saw blade is defective as it fails to include a pictogram warning against the installation of toothed blades demo saws. Oldham should have installed a prominently colored, pictogram on the packaging for its Heavy Duty Construction Carbide 14", 24 Tooth, saw blade, warning against its installation on gasoline powered, hand held, portable, demo saws. Oldham should have constructed such a pictogram by placing the ANSI Z535.3-2002 Prohibition symbol, in red, superimposed over a sketch of a portable gasoline powered demo saw. See attached.

6.142 Had Oldham's design of its packaging included such a pictogram it is reasonably likely that Jingoli employees handling the packaged saw blade, such as purchasing personnel, blade installers and field personnel including McGee, would have been alerted that the Oldham saw blade was unsafe for use on a TS 400; and McGee's injuries would not have occurred.

6.143 Manufacturers are, of course, not restricted to the industry available icon I propose. They certainly are free to create their own in order to indicate their blade is unsuitable for demo saws, as Amana Tool does for its A.G.E. 14" diameter X 24" blade. A.G.E.'s icon, which clearly depicts a demo saw, is remarkably similar to a Stihl TS 400. See attached.

6.144 A suitable image for manufacturers to utilize as an icon for concrete cutoff saws was available in 1990. A manufacturer, such as Oldham, wishing to convey to user that their 14" diameter 24 teeth blade was unsuitable and dangerous for use on concrete cutoff saws could



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have, in 1990, utilized an image similar to Figure No. 1 or No. 2 on page 3 of ANSI B7.5-1990. See attached. Such an image would clearly depict a concrete cut off saw.

6.145 Oldham warns on this Heavy Duty Construction Carbide 14", 24 Tooth saw blade:

WARNING: do not use this blade on multi-purpose cutoff saws including gas powered saws, unless saw has guard that completely covers both upper and lower half of the blade. This guard must extend to the lowest point of the cutting teeth on the bottom of the blade. Be sure to read owners manual of the saw and follow all instructions and safety procedures.

6.146 Oldham's warning is sufficiently vague as to require interpretation by the reader in order to determine if this blade is suitable for his demo saw. Stihl representatives have testified that no cut-off (demo) saw has been manufactured having such a guard.

6.147 Oldham's warning implies that these blades may be suitable for use on demo saws. It is reasonably foreseeable that persons may be unable to determine, or misinterpret, whether their demo saw is a multi-purpose cutoff saw, or not. Oldham knew, or should have known, that the industry standards, ANSI B 7.5 1990 and ANSI B175.4-2006 provides for the lower portion of abrasive wheel on gasoline powered, hand held, portable, demo saw to be unguarded and therefore, this blade is inherently not fit, nor safe for use on such machines. Oldham should have warned on the blade itself, and its packaging, categorically against installing these blades demo saws. Oldham's design of its warnings is defective as it fails to include such a categorical warning the blades use demo saws such as the TS 400.

6.148 Oldham did not install pictograms on this blade, warning against the installation of these blades on such demo saws. Attachment 6.148 illustrates the feasibility of pictograms on Oldham Heavy Duty Construction Carbide 14", 24 Tooth saw blades. These pictograms, however, indicate suitable blade applications. Oldham should have installed pictograms on the blade and placed its textural warning next to them.

6.149 It is the custom and practice of the major manufacturers of these portable gasoline powered demo saws to configure their machines for blade installation from the same side of their machines as this Stihl TS 400. Oldham's lack of warnings on the side of the blade facing the installer during installation means that no installer of Oldham blades on virtually any cut-off saw will be facing Oldham's warnings during blade installation. Oldham should have installed its warnings on the side of the blade facing the installer during installation. DeWalt, another division of Black & Decker, sells fourteen inch carbide-tipped saw blades for cutting ferrous metal (see DW7747, DW7745, DW7749) with writing on the side that would face the installer if installed on a Stihl demo saw.

6.150 Oldham's design of its Heavy Duty Construction Carbide 14", 24 Tooth saw blade on-blade warnings is defective as it places its warnings on the side of the blade that is away from the operator during installation, thereby making it significantly less likely to communicate its warnings to its installer (Photos # B 20, D 10, D 13 and D 20). Oldham should have placed its warnings on both sides of the blade.

6.151 Oldham's warnings on its Heavy Duty Construction Carbide 14", 24 Tooth saw blade does not include a pictogram warning against the installation of these blades on an abrasive demo saw. Oldham should have installed a prominently-colored, pictogram on its Heavy



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Duty Construction Carbide 14", 24 Tooth, saw blade warning against the installation of it on powered, hand held, portable, abrasive, demo saws. Oldham should have constructed such a pictogram by placing the ANSI Z535.3-2002 Prohibition symbol over the profile of a powered, hand held, portable, abrasive, demo saw.

6.152 Oldham should have displayed the warning with its icon in multiple locations on the blade so that at least one location is not obstructed by the blade guard and always visible to the installer when he attempts to install an Oldham toothed saw blade on these saws.

6.153 Oldham's design of its Heavy Duty Construction Carbide 14", 24 Tooth, saw blade is defective as it fails to include a pictogram on the blade warning against the installation of toothed blades on a gasoline powered, hand held, portable, demo saw.

6.154 Oldham failed to adequately warn on the blade itself, of severe injury or death as potential consequences of installing it on gasoline powered, hand held, portable, demo saws. Oldham's design of its Heavy Duty Construction Carbide 14", 24 Tooth saw blade is defective as it fails to adequately warn on the blade itself of the severe consequences of using this blade on a gasoline powered, hand held; portable, demo saw.

6.155 The incident saw blade is immediately recognizable as an Oldham blade, as the Oldham brand is the largest lettering on the blade. Oldham's lettering size of its on-blade warning is much smaller than the Oldham brand size. It is among the smallest print on the blade. Nobody involved in this incident knew that there was an on-blade warning. Had Oldham made adequate on-blade warning against the use of this blade on demo saws as reasonably conspicuous as its brand, it is substantially certain that its warning would have been observed by McGee and/or other Jingoli employees and McGee's injuries would not have occurred. A cause of McGee's injuries was Oldham failure to make adequate on-blade warnings that were sufficiently conspicuous.

6.156 Jingoli purchased the incident Stihl demolition saw on or about May 25, 2004, from Sanders Power Equipment Company (Sanders), 295 Andrews Avenue, Trevose, Pennsylvania 19053. Jingoli also purchased the Oldham saw blade from Sanders. Purchasing records show that Sanders sold many demo saws and wood cutting saw blades to Jingoli. Sanders never alerted Jingoli of Stihl's DVD instructing safe demo saw operation.

6.157 Distributors and suppliers, such Sanders typically have direct contact with consumers of the products they distribute. Such distributors and suppliers have an obligation to provide those consumers with equipment and supplies that are reasonably safe and fit for their intended use. It is the custom and practice for entities in the construction industry to rely upon distributors and suppliers of construction equipment and supplies to provide machinery and equipment that are reasonably safe and fit for their intended use. Distributors and suppliers have the obligation to warn their consumers of the reasonably foreseeable unfit and dangerous applications of the products they sell.

6.158 It is reasonably foreseeable that construction industry purchasers of demo saws would utilize such machines with toothed saw blades. Sanders knew, or should have known, that the Oldham 14", 24 toothed, circular saw blades was a designed for specialized applications. Sanders knew, or should have known, that Jingoli did not have any woodworking saws for which the specialized Oldham Heavy Duty Construction Carbide 14", 24 Tooth saw blade was suitable. Sanders knew or should have known, that the only machines Jingoli had that

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the Oldham Heavy Duty Construction Carbide 14", 24 Tooth saw blade would fit on was Stihl 14" demo saws.

6.159 Sanders also knew, or should have known, that the Oldham 14", 24 toothed saw blade would fit on Stihl TS 400 demo saws; and also of the dangerous hazards associated with using a Stihl TS 400 demo saw with a toothed saw blade on it. Sanders had an obligation to alert Jingoli of the availability of the Stihl training DVD. Sanders was aware that the TS 400's it sold to Jingoli did not include Stihl's instructional/safety DVD. These TS 400's were defective as they did not contain the DVD. This defect was easily correctible by Sanders. The opportunity to do so was virtually continuous.

6.160 Sanders had an obligation to warn Jingoli that the incident Stihl TS 400 demo saw was not fit, nor reasonably safe, for use with a toothed, circular saw blade and that the Oldham 14", 24 toothed, circular saw blade was not fit, nor reasonably safe, for use on Stihl TS 400 demo saws. A means for Sanders to address their obligation to Jingoli would have been to give Jingoli the \$4 - \$5 DVD with its \$821.50 purchase (0.6 % of the total purchase price).

6.161 A cause of Robert McGee's injuries was Sanders Power Equipment Company's failure to warn Jingoli that Oldham 14", 24 toothed, circular saw blades were not fit, nor reasonably safe, for use on Stihl TS 400 demo saws.

6.162 When shown an Oldham blade (McGee-16A), McGee recognized the Oldham brand (# 2, p.184). Everybody knows that the blade on the Stihl demo saw is an Oldham blade. Oldham's name is on it in letters approximately ½ inches high. Nobody involved in this incident knows that there is a warning on the Oldham blade and its packaging. Oldham wrote its packaging warning in lettering approximately .240 inch high. Oldham's warning against installing this blade on demolition saws, such as the incident Stihl lacks the conspicuity that that its band has. It is a time honored practice for manufacturers to brand their products with their name. It is in Oldham's interest for the users to recognize he is using an Oldham blade. It is in the user's interest to know his life is in danger if he uses the blade on a Stihl demolition saw. Oldham's warnings should be as conspicuous as Oldham's brand is.

6.163 (McGee, p. 233) The very existence of the anti-kickback pictogram warning against using the top part of the blade demonstrates that Stihl knows that this portion of the blade will at times be used. If Stihl wanted to preclude use of this portion of the blade it would have shrouded it with a guard, thereby preventing that portion from being exposed. However, such shrouding would also preclude that portion of the blade from entering the cut, thereby reducing the effective cut size that can be made by the blade. So, in order to retain the cut size, Stihl choose to warn against using that portion of the blade. However, it is reasonably foreseeable that there will be instances when that portion of the blade when it is in the cut, will contact material (unintentional or otherwise) and a kickback is likely to result. A cut-off saw operator should not be subjected to a severe, permanently debilitating injury, or death, for a simple momentary slight deviation in cut or small loss of control. The egregiousness of the consequences is extremely disproportionate to the physical misstep(s) producing them. In order to make this cutoff saw reasonably safe, Stihl needs to equip it with a mechanism (brake) to halt the blades rotation in a kickback.

6.164 The manual states on page five:

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Only attachments supplied by STIHL or expressly approved by STIHL for use with the specific STIHL cut-off machine are authorized. Although certain unauthorized attachments are useable with the STIHL powerhead, their use may, in fact be extremely dangerous.

6.165 Stihl knew that cutting attachments, such as the incident Oldham carbide-toothed wood cutting blade have been, and likely will be, installed and utilized on its TS 400 saws. Had Stihl manufactured its TS 400 saws with a non-standard arbor it would have foiled the utilization of the incident non-STIHL Oldham, toothed saw blade and Mr. McGee's injuries would not have occurred.

6.166 The Falls Township Police report states (p. 3) that while McGee was cutting the pipe, the saw kicked back causing McGee: "to loose balance and fall backwards. The saw blade came into contact with the right side of the victim's face after he hit the ground." This version is contrary to deposition testimony of accident witnesses (Rivera, Dubois). Accident witness deposition testimonies concur with McGee's version that he was hit in the face by the saw when it kicked back, cutting his face upon contact. McGee then exited the area between the pipes by climbing over one and then fell to the ground. There is no witness testimony to support the police report's version that McGee lost his balance, fell backwards and his face was struck by the saw after he fell to the ground. It is my engineering opinion that Mr. McGee's face was not struck by the saw after he lost his balance and fell as stated in the Falls Township Police report.

6.167 Ed Kuhn concluded that McGee's position at the time of this incident was awkward and did not allow for proper body posture or footing. Kuhn does not have any factual information to support his conclusion. He did not take any measurements of the incident piping, such as their spacing or heights above ground at the time of this incident, nor can he cite any reenactment of the accident which he can base his conclusion on. His conclusion appears to be after-the-fact speculation, not based upon any measurements, reconstruction or testing. It is my engineering opinion based on the photographs and deposition testimony that Mr. McGee was reasonably positioned for balance and stability between the two pipes and holding the saw in a reasonably safe manner.

6.168 There is a similar lack of evidence upon which to conclude that McGee was cutting with the top quadrant of the blade. Such a conclusion also seems to be after-the-fact speculation.

6.169 Based on Jingoli's past experience of cutting HDPE pipe with demo saws, it is reasonable that they would cut theses pipes supported, as the lay, by the trench, lip and dirt berm. In order to assure that the pipe would not move and pinch the blade during cutting, the pipes would have to have been secured to solid supports installed under the pipes, adjacent to and on both sides of the intended cuts. Pinching of the TS 400's blade in the cut is consistent with the field conditions at the time of this incident.

6.170 Securing the pipes with support strapping hung from an excavator's bucket poisoned overhead is not a practice that would assure pipe stability and non-pinching of the saw blade in the cut. It is not a safe practice to stand underneath an excavator's elevated bucket.

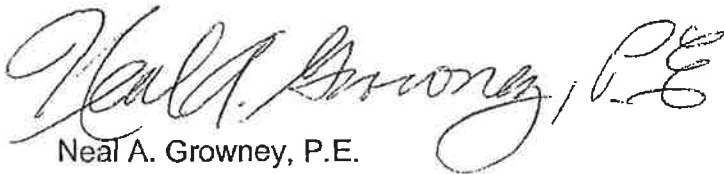
**Neal A. Gowney & Assoc., L.L.C.**

*Franklin Lakes, New Jersey 07417-2319*

**7.0 Conclusion.**

Within the bounds of a reasonable degree of engineering certainty, based upon my engineering education, training and experience, the facts of this case, and subject to new information, it is my professional opinion that the defects and deficiencies listed above were substantial causes of McGee's injuries. Those defective designs, warnings and deficiencies were substantial contributing factors/causes of this incident and McGee's injuries. Had any one or a combination of these defects or deficiencies not existed, it is within a reasonable degree of engineering probability that this accident and McGee's injuries would not have occurred.

Any references to Stihl in this report are intended to include Andreas Stihl who designed and manufactured the saw, and Stihl Inc. the US entity that imported and distributed the saw.

A handwritten signature in black ink, reading "Neal A. Gowney, P.E.", with a stylized, cursive script.

Neal A. Gowney, P.E.

**Photographs and Attachments**